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For the Advocate of Science.

STEAM BOATS, CANALS AND RAIL ROADS.

The means of facilitating locomotion are already so complete as almost obliterate the geographical distance from one place to another. But it ms that improvements, or at least innovations, are to be made in this re- ct. We believe that steam boats of the common construction have ched very nearly if not quite the acme of their speed. The Robert Mor- which runs on the Delaware between Philadelphia and Baltimore, may egarded almost as a master piece of human skill, combining the requi- s for the most rapid motion. It may reasonably be doubted if any material rovement on this model, or any material increase of the speed of steam els will ever be accomplished. The boat just referred to has frequently elled the distance between Philadelphia and New Castle, with the tide, few minutes over two hours—a distance very little, if any, less than 40 s. The resistance presented by the water to a body moving beyond rate increases so much more rapidly than the velocity of the body, as fer a serious obstacle to the further acceleration of steam boat motion. ut this obstacle has been overcome by an enterprising and ingenious en of the state of New York, who has just completed the construction steam vessel on a plan entirely new, and not a little curious. The no- y of this invention consists in two runners or buoys, on which the body e boat is erected, and thus elevated above the surface of the water. se runners are long spindle shaped bodies, tapering to a point at each in such a manner as to pierce the water and move through it with the t possible friction. A person who saw them compares their form to of segars, a form which one might suppose at a glance to be best cal- ted for the purpose. They are made to taper at both ends for very good ons. Those who are unacquainted with the principles of ship building, t not suppose that the construction of a vessel's stern has much to do her speed. But such a notion is very erroneous. If the stern be y and bulky, it drags through the water, and carries with it much *dead* r, as it is termed. That is, a considerable quantity of water directly nd the boat, moves along with the boat, and consequently a part of the r which should be wholly applied in propelling the vessel, is lost in ing along the *dead water*. Hence follows the importance of attending e construction of the whole length of the boat, as every portion of the that comes in contact with the water has more or less influence on ssel's velocity. But there is another important object to be gained e peculiar shape of the runners; the vessel is thus enabled to move in r direction, backwards as well as forwards; or rather there is no *back-* about it.

order to render the buoys as light as possible, they are hollow, and rity is filled with air, or with hydrogen gas, which has still greater , being the gas employed for inflating balloons. In the boat which I been describing, I am informed that hydrogen was used. The reader perceive that an increase of weight on the vessel above will have no effect than to depress the runners further into the water, without of- any material impediment to their movement. Hence the vessel will s fast, or very nearly as fast, when heavily laden, as without a load. e proprietor having framed a rough and imperfect vessel on this plan, shed with an engine like other steamers, set her afloat for experiment, e North River, a short time since. The result is said to have been very fying. She moved frequently at the rate of twenty miles an hour, and calculated that the speed may be increased to twenty-four or twenty- miles an hour. The number of revolutions made by the engine appears dicate her velocity. Thus, while her speed was twenty miles an hour, wheel made twenty revolutions per minute—and the velocity which she pable of attaining was estimated by the additional motion which the e is capable of. As the runners are exceedingly long, it would be in- ferred that there would be some difficulty in turning her speedily. But this is not the case; for owing to the form of the buoys, the vessel turns on her middle, while vessels of the common form turn from the extremity, where the rudder is situated. We may regard this invention as a double boat, instead of a single one, each runner being in principle a distinct boat. The chief difficulty in forming a model for a fast sailing vessel, depends on the ease with which a vessel is upset, when it is made so long and slender as to present but little resistance to the water. Two boats are in fact employed in the present case, and thus the occurrence of such an accident becomes impossible.

But although the rate of travelling by water promises to be much accelerated by this means, yet rail roads present a mode of locomotion over land, the rapidity of which is not to be compared with any velocity hitherto attained by artificial water communication—that is to say, by canals. Hitherto the proprietors of canals have prohibited the rapid motion of boats through them, under the impression that canal banks are more injured by the swift than by the slow movement of vessels. This opinion, however, has lately been questioned, and it is now generally admitted to be unfounded. On the Paisley canal, England, boats have been allowed to move at the rate of ten miles an hour for three years past, and the banks are said not to have suffered. Similar experiments have been tried on other canals with a similar result.

The action of steam boat paddles, however, is inadmissible on canals, on account of the great disturbance which it causes in the water. Hence, some other mode of conveyance must be adopted than such as are now in use, in order that canal travelling may compete with travelling by rail roads. The inventive genius of our countrymen has been taxed in this respect, and a new plan of propelling boats on canals is now proposed. A strong chain is to be stretched along the whole length of the canal, to which the propelling power is to be applied, instead of to the water. A wheel or drum is to revolve, by steam or otherwise, and to wind up the chain in passing, so as to pull the boat forwards, while the chain resumes its former situation in the bed of the canal, after having made two or three turns on the drum. A boat is now being constructed on this plan, for the purpose of experiment on the Chesapeake and Delaware canal. It is calculated that a speed of fifteen or twenty miles an hour can be attained by this method.

While on the subject of canals and rail roads, I may state that, in respect to economy, travelling by canals is much less expensive. It is found by experiment that the transportation of each passenger on the Liverpool and Manchester rail way costs the proprietors a fraction over one penny per mile, while a passenger is conveyed on the Paisley canal for less than a penny per mile, with profit to the canal company. The charge on the rail road amounts to nearly three pence per mile. The fare in the best rail way coaches is nearly three times as much as those in the best cabin of the canal boats; and the very lowest fare on the rail way, at a much reduced speed, is three half pence per mile, in an uncovered wagon, exposed to wind and rain, and to the steam and smoke of the engine. This is just double the fare by the canal boats, in covered cabins, at the rate of ten miles an hour.

The natural consequence of the facts which I have stated is the progressive falling away of passengers on the Liverpool rail way, and the progressive increase of passengers by the canal. The average daily number conveyed on the rail way in 1831 was 1,300, nearly; in 1833, 947. The number on the canal in 1831 averaged 258, daily; in 1833, 687.

When rail roads were first introduced, I recollect that the opinion became prevalent that they would in the end entirely supercede canals. My readers are at liberty to believe so still, if they can.

JUNIUS.

HISTORICAL EULOGY ON THE MARQUIS DE LAPLACE,

Delivered at a public session of the Royal Academy of Sciences, June 15, 1829, by M. Baron Fourier.

(*Continued from page* 148.)

Laplace had received from nature all the force of genius, which an immense undertaking can require. Not only has he reunited in his *Almageste, du 18e siecle*, that which the mathematical and physical sciences had already discovered, which serve as the foundation to astronomy; but he has added to this science some splendid discoveries which are peculiar to himself, and which had escaped all his predecessors. He has resolved, either by his own methods, or by those of which Euler and Lagrange had marked out the principles, the most important, and certainly the most difficult questions of all those which had been considered before him. His perseverance has triumphed over all obstacles. When his first attempts were unsuccessful, he renewed them, often under the most ingenious and the most difficult forms.

Thus we observe in the motions of the moon an acceleration of which we cannot discover the cause. We had thought that this effect could proceed from the resistance of the etherial region in which the celestial bodies move. If it were so, the same cause, affecting the course of the planets, would tend to change more and more the primitive order. These stars would be incessantly troubled in their course, and would end by being precipitated on the mass of the sun. It would be necessary that the creative power should interpose anew, to prevent or repair the immense disorder which the lapse of time had caused.

This cosmological question is assuredly one of the greatest which the human understanding can propose to itself: it is now resolved. The first researches of Laplace upon the invariability of the dimensions of the solar system, and his explanation of the secular equation of the moon, have led to this solution.

He had at first examined whether we could explain the acceleration of the moon's motion, on supposing that the action of gravity is not instantaneous but subject to a successive transmission, like that of light. In this way he could not discover the true cause. At last, a new research served his genius better. On the 18th of March, 1787, he gave to the Academy of Sciences a solution clear, and unattended with this insurmountable difficulty. He proved very distinctly that the acceleration observed is a necessary effect of universal gravitation.

This great discovery enlightened then the most important points of the system of the world. In effect, the same theory made him know that, if the action of gravitation upon the stars is not instantaneous, we must suppose it propagated more than fifty million times faster than light, the well known velocity of which is seventy thousand leagues a second.

He concluded still, from his theory of the lunar motions, that the medium in which the stars move, opposes only to the course of the planets a resistance, as it were, insensible; for this cause would above all things act upon the motion of the moon, and it produces upon it no observable effect.

The discussion of the motions of this star is pregnant with remarkable consequences. We can conclude from it, for example, that the motion of rotation of the earth around its axis is invariable. The length of the day has not changed one hundredth part of a second for two thousand years. It is worthy of notice, too, that an astronomer would have no need of leaving his observatory in order to measure the distance from the earth to the sun. It would suffice him to observe, constantly, the variations of the lunar motion: from these he could conclude this distance with exactness.

A consequence still more striking is that which relates to the figure of the earth; for the *form itself* of the terrestrial globe is imprinted upon certain inequalities of the course of the moon. These inequalities could not exist if the earth were perfectly spherical. We can determine the amount of the earth's ap*tisement*, (oblateness,) by observing the lunar motions o The results which we have deduced from them, agree with actual measures that have been obtained by the great geod cal voyages to the equator, to the northern regions, to In and to divers other countries.

It is to Laplace, above all, that we owe this astonishing p fection of modern theories.

I cannot undertake to point out here the series of his lab and the discoveries that have been the fruits of them. The e meration only, however rapid it may be, would exceed limits which I am bound to prescribe to myself. Besides researches on the secular equation of the moon, and the no difficult and no less important discovery of the cause of great inequalities of Jupiter and of Saturn, we have to cite admirable theorems on the libration of the satellites of Jup We must recal his analytical works on the ebb and flow of sea, and show the immense extent which he has given to question.

There is no important point of physical astronomy which not to him the object of deep study and discussion. He mitted to calculation most of the physical conditions whic predecessors had omitted. In the question already so com of the form and of the motion of the earth's rotation, he considered the effect of the presence of waters distributed tween the continents, of the compression of the interior st of the secular diminution of the dimensions of the globe.

In this *ensemble* of researches, we must, above all, no those which relate to the stability of great phenomena: no ject is more worthy of the meditation of philosophers. Thus have observed that the causes, whether casual or const which trouble the equilibrium of the seas, are subject to li which cannot be surpassed. The specific gravity of the wa being much less than that of the solid earth, it thence res that the oscillations of the ocean are always comprised betw very narrow limits; which would not take place, were the f spread over the globe much heavier. In general, nature h in reserve, preserving and ever present forces, which ac soon as trouble commences, and with the greater power in portion to the increased magnitude of the aberration. They lay not to reëstablish the wonted order. We find in all p of the universe this preserving power. The form of the g planetary orbits, and their inclinations, vary and change in course of centuries; but these changes are limited. The p cipal dimensions subsist. This immense assemblage of cele bodies oscillates around a mean state, towards which always carried back. All is disposed for order, perpetuity harmony.

In the primitive and liquid state of the terrestrial globe, heaviest particles are drawn nearest the centre; and this dition has determined the stability of the sea.

Be the physical cause of the formation of the planets wh may, it has fixed upon all these bodies a motion of projectio the same direction around an immense globe. By this solar system is become stable. The same effect is duced in the system of satellites and of rings. The order t is maintained by the power of the central mass. This po is not then, as Newton himself, and as Euler, too, suspected adventitious force which, one day, must repair or prevent trouble which time had caused. It is the law itself of gra tion that governs all, suffices for all, and maintains variety order. Having emanated once from supreme wisdom, it sides from the beginning of time, and renders all disorder possible. Newton and Euler still knew not all the perfect of the universe.

In general, every time that there has arisen any doubt on exactness of the Newtonian law, and that, to explain the appa irregularities, we have proposed the addition of a strange ca

more than a week, he could meet with no individual among the natives who would part with an axe, or even a hatchet, in exchange for them.

DR. GODMAN'S RAMBLES OF A NATURALIST.

Continued from page 150.

Those who have only lived in forest countries, where vast tracts are shaded by a dense growth of oak, ash, chesnut, hickory, and other trees of deciduous foliage, which present the most pleasing varieties of verdure and freshness, can have but little idea of the effect produced on the feelings by aged forests of pine, composed in a great degree of a single species, whose towering summits are crowned with one dark green canopy, which successive seasons find unchanged, and nothing but death causes to vary. Their robust and gigantic trunks rise a hundred or more feet high in purely proportioned columns, before the limbs begin to diverge; and their tops, densely clothed with long bristling foliage, intermingle so closely as to allow of but slight entrance to the sun. Hence the undergrowth of such forests is comparatively slight and thin, since none but shrubs and plants that love the shade, can flourish under this perpetual exclusion of the animating and invigorating rays of the great exciter of the vegetable world. Through such forests, and by the merest foot paths in great part, it was my lot to pass many miles almost every day; and had I not endeavored to derive some amusement and instruction from the study of the forest itself, my time would have been as fatiguing to me, as it was certainly quiet and solemn. But wherever nature is, and under whatever form she may present herself, enough is always proffered to fix attention and produce pleasure, if we will condescend to observe with carefulness. I soon found that even a pine forest was far from being devoid of interest, and shall endeavor to prove this by stating the result of various observations made during the time I lived in this situation.

The common pitch, or as it is generally called Norway pine, grows from a seed, which is matured in vast abundance in the large cones peculiar to the pines. This seed is of a rather triangular shape, thick and heavy at the part by which it grows from the cone, and terminating in a broad membranous fan or sail which, when the seeds are shaken out by the winds enables them to sail obliquely through the air to great distances. Should an old corn-field or other piece of ground be thrown out of cultivation for more than one season, it is sown with the pine seeds by the winds, and the young pines shoot up as closely and compactly as hemp. They continue to grow in this manner until they become twelve or fifteen feet high, until their roots begin to encroach on each other, or until the stoutest and best rooted begin to overtop so as entirely to shade the smaller. These gradually begin to fail, and finally dry up and perish, and a similar process is continued until the best trees acquire room enough to grow without impediment.

Even when the young pines have attained to thirty or forty feet in height, and are as thick as a man's thigh, they stand so closely together that their lower branches, which are all dry and dead, are intermingled sufficiently to prevent any one from passing between the trees without first breaking these obstructions away. I have seen such a wood as that just mentioned, covering an old corn-field, whose ridges were still distinctly to be traced, and which an old resident informed me he had seen growing in corn. In a part of this wood which was not far from my dwelling, I had a delightful retreat that served me as a private study or closet, though enjoying all the advantages of the open air. A road that had once passed through the field, and was of course more compacted than any other part, had denied access to the pine for a certain distance, while on each side of it they grew with their usual density. The ground was covered with the soft layer or carpet of dried pine leaves which gradually and imperceptibly fall throughout the year, making a most pleasant surface to tread on, and rendering the step perfectly noiseless. By beating off with a stick all the dried branches that projected towards the vacant space, I formed a sort of chamber, fifteen or twenty feet long, which above was canopied by the densely mingled branches of the adjacent trees, although they excluded or scattered the rays of the sun, and on all sides was so shut in by the trunks of the young trees, as to prevent all observation. Hitherto during the hot season, I was accustomed to retire, for the purpose of reading or meditation; and within this deeper solitude, where all was solitary, very many of the subsequent movements of my life were suggested or devised.

From all I could observe, and all the inquiries I could get answered, it appeared that this rapidly growing tree does not attain its full growth until it is eighty or ninety years old, nor does its time of full health and vigor much exceed a hundred. Before this time it is liable to the attacks of insects, but these are of a kind that bore the tender sprig shoots to deposit their eggs therein, and their larvæ appear to live principally on the sap which is very abundant, so that the tree is but slightly injured. But after the pine has attained its acme, it is attacked by an insect which deposits its egg in the body of the tree, and the larva devours its way through the solid substance of the timber; so that after a pine has been for one or two seasons subjected to these depredators, it will be fairly riddled, and if cut down is unfit for any other purpose than burning. Indeed, if delayed too long, it is poorly fit for firewood, so thoroughly do these insects destroy its substance. At the same time that one set of insects is engaged in destroying the body, myriads of others are at work under the bark, destroying the sap vessels, and the foliage wears a more and more pale and sickly appearance as the tree declines in vigor. If not cut down, it eventually dies, becomes leafless, stripped of its bark, and as the decay advances, all the smaller branches are broken off; and it stands with its naked trunk and a few ragged limbs, as if bidding defiance to the tempest which howls around its head.

Under favorable circumstances, a large trunk will stand in this condition for nearly a century, so extensive and powerful are its roots, so firm and stubborn the original knitting of its giant frame. At length some storm more furious than all its predecessors, wrenches those ponderous roots from the soil, and hurls the helpless carcase to the earth, crushing all before it in its fall. Without the aid of fire, or some peculiarity of situation favorable to rapid decomposition, full another hundred years will be requisite, to reduce it to its elements, and obliterate the traces of its existence.

Indeed, long after the lapse of more than that period, we find the heart of the pitch pine still preserving its original form, and from being thoroughly imbued with turpentine, become utterly indestructible except by fire.

If the proprietor attends to the warnings afforded by the wood-pecker, he may always cut his pines in time to prevent them from being injured by insects. The wood-peckers run up and around the trunks, tapping them from time to time with their powerful bills. The bird knows at once by the sound whether there be insects below or not. If the tree is sound, the woodpecker soon forsakes it for another; should he begin to break into the bark, it is to catch the worm, and such trees are at once to be marked for the axe. In felling such pines, If ound the woodmen always anxious to avoid letting them strike against neighboring sound trees, as they said that the insects more readily attacked an injured tree than one whose bark was unbroken. The observation is most probably correct, at least the experience of country folks in such matters is rarely wrong, though they sometime give very odd reasons for the processes they adopt.

A full grown pine forest is at all times a grand and majestic object to one accustomed to moving through it. Those vast and towering columns, sustaining a waving crown of deepest verdure; those robust and rugged limbs standing forth at a vast height overhead, loaded with the cones of various seasons; and the diminutiveness of all surrounding objects compared with these children of nature, cannot but inspire ideas of seriousness and even of melancholy. But how awful and even tremendous does such a situation become, when we hear the first wailings of the gathering storm, as it stoops upon the lofty summits of the pine, and soon increases to a deep hoarse roaring, as the boughs begin to wave in the blast, and the whole tree is forced to sway beneath its power.

In a short time the fury of the wind is at its height, the loftiest trees bend suddenly before it, and scarce regain their upright position ere they are again obliged to cower beneath its violence. Then the tempest literally howls, and amid the tremendous reverberations of thunder, and the blazing glare of the lightning, the unfortunate wanderer hears around him the crash of numerous trees hurled down by the storm, and knows not but the next may be precipitated upon him. More than once have I witnessed all the grandeur, dread, and desolation of such a scene, and have always found safety either by seeking as quickly as possible a spot where there was none but young trees, or if on the main road choosing the most open and exposed situation out of reach of the large trees. There, seated on my horse, who seemed to understand the propriety of such patience, I would quietly remain however thoroughly drenched, until the fury of the wind was completely over. To say nothing of the danger from falling trees, the peril of being struck with lightning, which so frequently shivers the loftiest of them, is so great as to render any attempt to advance highly imprudent.

Like the ox among animals, the pine tree may be looked upon as one of the most universally useful of the sons of the forest. For all sorts of building, for firewood, tar, turpentine, rosin, lampblack, and a vast variety of other useful products, this tree is invaluable to man. Nor is it a pleasing contemplation, to one who knows its usefulness, to observe to how vast an amount it is annually destroyed in this country, beyond the proportion that nature can possibly supply. However, we are not disposed to believe that this evil will ever be productive of very great injury, especially as coal fuel is now becoming annually more extensively used. Nevertheless, were I the owner of a pine forest, I should exercise a considerable degree of care in the selection of the wood for the axe.

MISCELLANIES.

1. *A canal made by a storm.*—An extraordinary operation of nature lately occured on the shore of Lake Erie, in Upper Canada. At a place called Long point, it was in contemplation to construct a canal across a promontory, the expenses of which were estimated at 12,000 pounds, or upwards of 30,000 dollars. Nature, however, took the job out of the hands of the people. During a severe storm, a canal was washed through the promontory nearly in the spot designated, the middle of which

is 300 yards and its depth 10 or 12 feet. This fact which appears well attested, is a very good illustration of the force of water, and might with propriety be introduced into the geological essays lately published in the Advocate, under the head of *Diluvial operations.*

2. *Steam boat explosions.*—A bill has been introduced into congress, the purport of which is to secure the lives of our citizens from the numerous steam boat exylosions of every day occurence in the United States, especially on the western waters. It provides among other things that every such accidents should be the subject of judicial investigation, when should it not appear that the accident was totally unavoidable, the boat shall be forfeited by its owner. This proposition is predicted on the demonstrable truth that the explosion of steam boilers has in nearly every instance been traced to the carelesness of those concerned. The inquiry recently made with respect to the sad calamity which befel the New England, has terminated in the conviction that gross negligence was the cause of that accident.

3. *Application of galvanism to dead bodies.*—The two negroes lately executed in Baltimore were made the subjects of some interesting galvanic experiments. By the application of the wires of the battery to particular nerves of the muscles of the body were thrown into active motion. The countenance of one was convulsed during the operation, though the subject had been dead two or three hours. A phrenologist who was present described the fatal bump on the skull which had created the impulse to the action on account of which the criminal suffered. It strikes us that if this phrenologist was right, the person was virtually hung for being made with a bump on the head.

4. *Taming Animals.*—Upon the Surrey side of Waterloo Bridge (or sometimes, though not so often, on the same side of Southwark Bridge) may be daily seen a cage, about five feet square, containing quadrupeds and birds. The keeper of this collection, John Austin, states that he has employed seventeen years in this business of training creatures of opposite natures to live together in content and affection. And those years have not been unprofitably employed.

It is not too much to believe, that many a person who has given his half-penny to look upon this show, may have had his mind awakened to the extraordinary effects of habit and gentle discipline, when he has thus seen the cat, the rat, the mouse, the hawk, the rabbit, the guinea pig, the owl, the pigeon, the starling and the sparrow, each enjoying, as far as can be enjoyed in confinement its respective mode of life, in the company of others,—the weak without fear, and the strong without the desire to injure. It is impossible to imagine any prettier exhibition of kindness than is here shown.

The rabbit and the pigeon playfully contending for a lock of hay to make up their nests; the sparrow sometimes perched on the head of the cat, and sometimes on that of the owl—each its natural enemy, and the mice playing about with perfect indifference to the presence either of cat, or hawk, or owl. The modes by which this man has effected this, are, first, by keeping all the creatures well fed; secondly, by accustoming one species to the society of the other at a very early period of their lives. The ferocious instincts of those who prey on the weaker are never called into action; their nature is subdued to a systematic gentleness, and their kindlier dispositions are cultivated. All their desires and all their pleasures are bounded by their little cage; and though the old cat sometimes takes a walk on the paropet of the bridge, he duly returns to his companions, with whom he has so long been happy, without at all thinking that he was born to devour any of them. This is an example, and a powerful one, of what may be accomplished by a proper education, which rightly estimates the force of habit, and confirms by judicious management that habit which is most desirable to be made a rule of conduct. The principle is the same whether it be applied to children or to brutes.—*Lib. Ent. Knowledge.*

5.—We find in a late London Magazine the following paragraph translated from the Revue Medicale.

"When all other means fail in arresting hæmorrhage, a little oil of tobacco has immediately succeeded. That which collects in the stems of pieces which have been long smoked will answer perfectly. The discovery was made by Humel, a chemist at Berlin, and his mixture is eight ounces of distilled water, two drachms of oil of tobacco, and a few drops of etherial animal oil. This has been found so effectual, that by a recent decree of the minister of the interior at Munich, all apothecaries are ordered to keep it prepared.

6. *Indigo.*—The history of Indigo in America is very curious. At one time it was the second staple produce of Carolina. Mrs. Pinckney received some indigo seeds from her father, the governor of Antigua. She planted them in March 1742—the indigo was cut down by the frost—she planted again in April, and it was lost again; she tried again, and having succeeded, she distributed the seed. Hence the culture became common, and in a few years it was an article of export.

7. *Steamboats.*—The Insurance Companies of Louisiana have adopted the following resolution: "That on the report of the inspectors of the offices, of any boat being overladen or improperly stowed, the name of the said boat shall be erased from the books of the office, and any further risk on her declined."

8. *Barbarian Sacrifices.*—Among the islands of the Pacific ocean, the practice of sacrificing infants is carried on to an almost incredible degree. In Ellis' account, the correctness of which he says there is every reason to believe, the statement supposes at least two-thirds of the children perish by the prevalence of infanticide. Some parents have been known to murder three or four infants where they have spared one. In the Society islands, they were sacrificed immediately after birth; for if they were permitted to live over a day, and in some instances a few hours, it was sufficient to enlist the mother's affection so far as to secure its existence. But in the Sandwich Islands, the infant was still insecure after living a week, a month, or a year; and some were destroyed when nearly able to walk. A practice so revolting to every human feeling, cannot but illustrate the importance of introducing the arts of civilization among these people.

The Laplander's specific for the colic.—The *oullem* or colic occasioned by the vapid and heated waters of lakes and marshes, could hardly be supposed a disease of polar countries, but it is not uncommon in Lapland, and the specific employed against it, is a sort of fungus that grows on birch trees; small fragments are set on fire, applied to the part affected, and allowed to burn slowly.—*Malte Brun.*

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CONTRIBUTIONS TO GEOLOGY.

This is the title of a very handsomely executed work a copy of which has been kindly presented to us by the author, Isaac Lea, and we have looked over it with much satisfaction. It is a large octavo, containing 227 pages, and descriptions of 228 species of fossils, principally from the formations of Claiborne, Alabama; the same locality as T. A. Conrad has been so assiduously and successfully engaged in investigating for more than a year past. A representation of each species is given in beautifully engraved plates, at the conclusion of the volume. Works of this kind are much required to illustrate the natural history of our country.

Snow fell to the depth of 26 to 30 inches, in Staunton Virginia on the 14th inst. and on the 16th about 4 inches more. The Spectator says that the streets of Staunton are nearly blocked up with snow, and that many barns and sheds in the country adjacent have been broken down.

ARCTIC EXPEDITION OF CAPTAIN ROSS.

Most of our readers have probably read the account of the return of the enterprising Ross, after an absence of four years and a half, when nearly every hope of his return or existence had been given up, and when another expedition under the direction of Captain Bock had just been despatched to ascertain if possible the fate of the former. It will be recollected that Ross sailed from England in May, 1829, for the purpose of exploring a north west passage from the Atlantic to the Pacific.

In August, he reached the spot where the stores of the ship Fury, which had been wrecked on a previous expedition, were deposited. He then penetrated Prince Regent Inlet to latitude 70° N., longitude 92° W. from London, where he found a good harbor for the winter, which he named Felix harbor.

In the summer of 1830 a friendly intercourse with a tribe of natives was established, who put our navigator in a track of a great sea to the south west, which he partially explored, without finding a passage. The next winter was intensely cold, the thermometer falling at one time to 92 degrees below zero, a lower degree than was ever before experienced. The summer following was too cold to allow of much progress, and another severe winter, followed, which closed up the prospect of farther adventures, and obliged the company to burn their ships, and retreat to the Fury Beach, the name given to the place where the Fury was lost. Here they wintered, undergoing incredible hardships. The next summer they succeeded in reaching Admiralty Inlet, then Navy Board Inlet, when to their inexpressible joy, they descried the ship Isabella of England, in search of them. They were received on board the Isabella on the 26th of August, 1833.

It is astonishing that the human body can bear such severe privations and sufferings as this expedition was subjected to; only three of their number died, and two of those were taken off soon after they left England, by diseases not peculiar to the climate. The results of this expedition are described by Capt. Ross to be these:—"The discovery of the Gulf of Boothia, the Continent and Isthmus of Boothia Felix, and a vast number of islands, rivers and lakes; the undeniable establishment that the N. W. point of America extends to 74° north latitude; valuable observations of every kind, but particularly on the magnet; and to crown all, we have had the honor of placing the illustrious name of our most gracious Sovereign William IV, on the true position of the magnetic pole.

We may expect shortly to be favored with a full account of this enterprize in the form of a book. It will be very interesting and useful to science. The search for a north west passage however, we believe to be in itself very useless. If such a passage exist, the navigation of it would certainly be totally impracticable.

For the Advocate of Science.

Sir—A young lady of this city lately purchased a beautiful mouse colored tippet, which retains the scent of the animal so strongly as to prevent her from wearing it. What will remove the scent? an answer will much oblige many other ladies in the same predicament. A. F.

Alexandria D. C.

For the Advocate of Science.

ANSWER TO THE QUERY OF S. L.

In the last number of the Advocate your correspondent S. L. asks why it is sometimes too cold for snow. I will endeavor to explain it.

In order for the production of snow the cloud which supplies the moisture must float on the surface of the cold stratum of air by which it is frozen. The air in which the cloud is, cannot be so cold, because a cloud cannot exist in a freezing atmosphere. If the weather be extremely cold the probability is that this cold stratum of air extends to a great height, and a high cloud, we know seldom parts with its moisture.

Speaking with precision, it can never be too cold for snow.

In the polar regions, snow falls when the air is colder that our climate ever becomes. This is a positive proof that *cold* of itself, cannot prevent a fall of snow. We observe however that our coldest weather is always clear, owing to the direction of the wind which produces cold. If the wind be from a quarter favorable for snow, the degree of cold cannot be extreme. It follows that although our snow storms generally occur in weather *moderately* cold, yet that is only a *coincidence*, occasioned in part by the circumstances of our coldest wind being also driest, and in part by the influence on our atmosphere of a current of air above warm enough to form clouds.

I have heard persons remark, in pointing to the white fleecy clouds which sometimes precede a snow storm that such clouds contain snow. Such an idea, like many others entertained by persons of *careless* and *lazy* habits of mind, is an absurdity. The moment a cloud freezes, that moment the frozen particles descend to the earth. A cloud must always be composed of unfrozen vapor.

For the Advocate of Science.

I observed among the Miscellanies in your last paper, an article headed "Instinct of Horses" giving an account of a pair of horses which refused to travel with a buffaloe skin spread over the sleigh behind them. The account states that they could not see the skin, and that they travelled well as soon as the skin was packed in the sleigh.

Now it appears to my understanding, that the buffaloe skin could only have been communicated to the horses through the medium of one of two senses, the eyes, or the nose. As they did not see it, the smell must have been the means of their detecting its presence. I would like to know whether it did not continue to impart its odor to the air after it was packed in the sleigh. Or at any rate, I would like to see some explanation of the curious fact. MICROSCOPE.

For the Advocate of Science.

PREJUDICE AGAINST SNAKES.

Perhaps no department of industry has suffered more in a pecuniary point of view, from ignorane of the natural sciences than agriculture; and yet there are none others which afford so many facilities for successful cultivation. The habits of different portions of the animal creation are continually before the view of the observing farmer, and if disposed, he may avail himself of their aid in destroying the hordes of enemies which feed on the fruits of his labor: But as generally is the case, through ignorance of the services of his friends and auxiliaries he ungratefully drives them from his enclosures, and with an illiberal and short sighted prejudice denies them a place within his dominions.

Among the animals which are almost universally proscribed in this country and throughout Christendom may be ranked the various species of snakes; and the general antipathy towards them has been the means of nearly exterminating many kinds from different parts of the world. This feeling of indiscriminate hostility to the whole serpent tribe, may be ascribed to two prominent causes. One is the poisonous nature of some species, which has cast a reproach on the whole family. We behold a numerous genus of animals, resembling each other in habits and general appearance. And experience has proved that the *bite* of a few of these is exceedingly noxious, causing extreme pain, and in some instances death. These poisonous reptiles are provided with fangs of a peculiar description, which contain the subtle and deadly fluid—and a quick stroke communicates the venom. But much the larger portion of snakes occasionally seen in our woods and fields are entirely destitute of this dangerous weapon. The black—the garter—the house and the water snake have no poisonous fangs, and the feeble bite sometimes attempted by them when hard pressed is as harmless as that of the eel! yet, they are all classed together with the envenomed rattle snake and viper, by those who have taken no pains to study their history. There is another prejudice against the "serpent kind," derived from a more artificial source. But the feeling inspired is not the less strong and durable on that account. In the historical relation of the temptation and fall of man, it will be recollected that the literal interpretation of the record, gives the "serpent" an important agency in this diabolical business. Hence, the whole family has been implicated in the work; and although we are not informed to what species of these reptiles the one belonged, who commited such an outrage on our first parents; yet all seem to receive a full share of the odium and hatred attached to their race. Each individual is obliged to learn *practically* the evils inseprable from a bad name. Now I believe that this indiscriminate hostility is the offspring of ignorance and prejudice. Did we allow ourselves to inquire into the nature of this species of animals—to become acquainted with their habits and means of subsistence, we might discover that our interest would be materially consulted, by extending a protecting hand—instead of destroying them whenever the chance offers. It is well known that field mice commit very serious depredations on the crops of the farmer, at various times of the year. And that the labor of the gardener and horticulturist are almost equally affected by their ravages. Now these little animals so destructive to the products of rural industry (when they become numerous) are the natural food of snakes, which seize on their prey whenever they come within their reach. I have repeatedly ascertained, by examining snakes killed in the hay and harvest field, that their sustenance has been obtained in this manner.

But being desirous of obtaining more general information on this subject, I lately conversed with an eminent naturalist residing in Bucks county, who fully confirmed my views, as above expressed, and related an incident directly to the point.

One day last summer, hearing the noise of a mouse, near the corner of his garden, he was attracted to the spot, and observed a *garter snake* in possession of a field mouse. He stood at a sufficient distance not to alarm the reptile, while he witnessed the whole operation of *swallowing*. He then suffered the snake to go away with inpunity giving particular orders to his men that no one should in future be killed on his farm.

The black snake has been frequently seen at a nest of young mice, picking them out and devouring them; and yet this friend of the farmer has been destroyed on the spot perhaps before he had finished his meal.

It was with pleasure I remarked that during last summer several farmers in my neighborhood, *prohibited* the killing of certain species of snakes, and I know in some instances, their injunctions were strictly followed. The above brief hints are here given with a view of inducing agriculturists to investigate the subject—and if they contain any thing worthy of consideration, it is hoped they may receive attention from those most interested.

AGRICOLA.

VALUE SET ON IRON AND ON TOOLS BY SAVAGES.

We gave our readers some time back, a few interesting extracts from the Library of Entertaining Knowledge describing the impressions produced on the New Zealanders by the arts and inventions of civilized life. The following extract from Ellis' Polynesian Researches, in relation to the natives of Tahiti, is similar in nature, and will be read with interest.

Their acquaintance with the most useful of the mechanic arts naturally delighted the natives, but raised the missionaries in their estimation and led them to desire their friendship. This was strikingly evinced on several occasions, when they beheld them use their carpenter's tools, cut with a saw a number of boards out of a tree which they had never thought it possible to split into more than two, and make with these, chests and articles of furniture. They beheld with pleasure and surprise the daily progress in the building of a boat upwards of twenty feet long, and six tons burthen, which was ultimately finished; but when the blacksmith's shop was erected, and the forge and anvil were first employed on their shores, they were filled with astonishment. They had long been acquainted with the properties and uses of iron, having procured some from the natives of a neighboring island, where a Dutch vessel, the African Galley, belonging to Roggewein's squadron, had been wrecked in 1772, upwards of forty years before they were visited by Captain Wallis. When the heated iron was hammered on the anvil, and the sparks flew among them, they fancied it was spitting at them, and were frightened, as they also were with the hissing occasioned by immersing it in water; yet they were delighted to see the facility with which a bar of iron was thus converted into hatchets, axes, fishing-spears, fish-hooks, &c. Pomare entering one day when the blacksmith was employed, after gazing a few moments at the work was so transported at what he saw, that he caught up the smith in his arms, and unmindful of the dirt and perspiration inseparable from his occupation, most cordially embraced him, and saluted him, according to the custom of his country, by touching noses. Iron tools they considered the most valuable articles they could possess; and a circumstance that occured during the second visit of the Duff will decidedly show the comparative value they placed upon gold and iron. The ship's cook had lost his axe, and Captain Wilson gave him ten guineas to try to purchase one from the natives, supposing that the intercourse already had with Europeans would enable them to form some estimate of the value of a guinea, and the number of articles they could procure with it from any other ships that might visit the island; but although the cook kept the guineas

as always happened, after a thorough examination, that the inal law has been verified. It now explains all the known nomena. The more precise the observations, the more do they form to the theory. Laplace is, of all geometers, *the one* who investigated these questions the most; he has, so to speak, ed them.

We cannot affirm that it was granted to him to create a nce entirely new, as Archimedes and Galileo have done: to e to mathematical doctrines original principles, like Descartes, rton, and Leibnitz; or like Newton, to transport the first into skies, and to extend to all the universe the terrestrial dyna- of Galileo; but LAPLACE was born to bring every thing to fection, to investigate every thing, to extend all the limits, to resolve what had been thought incapable of solution. He ld have completed the science of the heavens, if this science ld be completed.

We find again the same character in his researches upon the lysis of probabilities, a science entirely modern and immense, object of which, often misconceived, has given rise to the t false interpretations; but the application of which will one embrace the whole field of human knowledge, a happy *sup- ment* to the imperfection of our nature.

This art sprung from a single feature of the clear and fruitful ius of Pascal; it has been cultivated from its origin, by Fer- and Huygens. A philosophical geometer, James Bernouilli, its principal founder. A remarkably happy discovery of ling, the researches of Euler, and especially an ingenious important application due to Lagrange, have brought this trine to perfection; it has been enlightened by the objections nselves of D'Alembert, and by the philosophical views of Con- cet. Laplace has reunited and fixed its principles. From nce it has become a new science, subject to a single analytical thod, and of a prodigious extent. Rich in common applica- s, it will one day enlighten up with a vivid light all the nches of natural philosophy. Were it permitted us here to ress a personal opinion, we will add that the solution of one the principal questions, one which the illustrious author has ated in the tenth chapter of his work, does not appear to us ct; and yet, considered in its *ensemble*, this work is one of the st precious monuments of his genius.

(*To be continued.*)

For the Advocate of Science.

ON METEORS, OR SHOOTING STARS.

Having, in my previous essays, furnished a brief description of meteoric phe- ena, I will now proceed to make a few remarks on their origin and causes, on the several theories which pretend to explain them. One of the most an- t and most common opinions refers them to the combustion of gases or in- mable vapors in the upper regions of the atmosphere. Hydrogen, the most mmable of these substances is known to be extremely light, and is therefore rted to exist in considerable quantity in elevated regions. But this idea is almost universally exploded, and I am not aware that a single scientific r of the present day supports the gaseous theory. No superabundance of rogen gas is detected in the atmosphere of the highest situations on the globe. established law of gaseous mixture is at variance with such an idea; for it is wed that if a light gas, such as hydrogen, be contained in a vessel which com- nicates by a small tube with a similar vessel of common air, or other heavier the two gases will mingle together, although the lighter one should have n contained in the upper vessel, and no agitation used. That the aurora ealis depends on the combustion of gas, was also a prevailing notion before the overy of the peculiar properties of the electric fluid. But the aurora borealis now admitted by every body to proceed from the circulation of the electrical id. It is equally evident that the doctrine which ascribes the production of teoric stones to flashes of lightning, is untenable; for lightning does not ac- mpany meteoric exhibitions. The same may be said of the belief that they e from the combustion of inflammable gas kindled by the electric spark.

Another theory regards them to be ejected from the volcanoes of our globe. That they proceed from volcanoes in the moon is a view supported by good authorities. It is argued by another class of theorists that they are minute planets or comets, which have been revolving in the solar system since its creation, which occasionally impinge on the earth. Again, they have been supposed to be fragments of the original planet, by the explosion of which the four asteroids were formed.

Another theory ascribes all meteoric appearances to electrical agency.

Without pretending to decide at present whether or not the two kinds of meteors that I have described are identical, which is the prevailing opinion, I will now inquire into the cause of the most frequent kind, viz. shooting stars. These I believe to depend on electricity.

That electricity may give rise to appearances very similar to those in question, none can doubt. The aurora borealis, in some latitudes, has a very near resemblance to shooting stars. There is also a proof of this assertion in an account of a curious phenomenon given by Signor Beccaria, an Italian.* About an hour after sunset he and some friends that were with him observed a falling star directing its course towards them, and apparently growing larger and larger; but it disappeared not far from them without any noise, leaving their faces, hands and clothes illuminated with a diffused light. During their surprise at this occurrence, a servant ran to inform them that he had seen a light shine suddenly in the garden, and especially on a stream which he was pouring from a watering pot. Beccaria was confirmed in the belief that this depended on electricity by observing electrical light around a kite which he was about to raise. The electricity, he relates, approached the head of his kite, assuming very much the same appearance as that of a falling star.

It may be objected to the view that shooting stars depend on electricity, that they are so high as to be beyond the influence of our atmosphere. This very circumstance, however, tends to confirm the supposition. For, so far from the presence of air being required for the exhibition of electrical action, *a vacuum is a good conductor of the fluid.*

But the most unanswerable argument in support of this theory, is the fact that the magnetic needle is sensibly affected by meteoric appearances. The truth of this remark with respect to the aurora borealis was long ago established; but I believe it is to Humboldt that we owe the discovery of the influence of shooting stars on the magnet. He found the needle to be sensibly affected during the brilliant meteoric exhibition observed by him in South America. Between magnetism and electricity there is so intimate a relation that the one can only be considered an effect or modification of the other.

As for the volcanic theory of meteors, that they originate in terrestrial volcanoes, their composition is almost sufficient to disprove; for none of the substances known to be thrown from volcanoes are analogous in their ingredients to meteoric stones. Besides, if a volcano exerted sufficient force to throw large masses to so great a distance, why do we not perceive evidences of this force in the copious descent of stones five or ten miles from a volcano? I presume no one will contend that those meteors which I have ascribed to electricity are solid bodies ejected from volcanoes.

As to the theory of lunar volcanoes, this is more unanswerable because it is more untangible. In support of it, it has been proved that a body projected from the moon with a force four times greater than a cannon ball is propelled from a cannon, will not return to the moon, but will continue its motion till it becomes subjected to the attractive power of some other heavenly body. Hence we can easily conceive that a sufficient force may or can be exercised by a volcano in the moon to throw stones to the earth. But, with a due degree of patriotic feeling for our globe, I think we should claim as much potency for our own volcanoes as we allot to those of the moon. And I do not think it quite reasonable to persuade ourselves and one another that the moon is capable of doing injury to our earth with her missiles, when we know that our sublunary sphere is not endowed with ability to return the compliment.

But, to be more serious, this theory certainly must require a distribution of meteors into two classes. For no one will believe that the hundreds and thousands of falling stars lately visible on a single night were so many stones, winging their way from the artillery of the moon. Had they been solid bodies, their fall would necessarily have been observed in great quantities throughout the United States. In vain will it be argued that their great altitude and amazing velocity carried them beyond the sphere of our observation, not suffering them to touch the earth. No projectile force could be imparted to bodies as small as most or many of these meteors undoubtedly were, sufficient to enable them thus to overcome the com-

* Rees' Cyclop. art. star.

bined force of the attraction of the earth, and the resistance of our atmosphere, into which they must have entered.

It would perhaps be proper to mention that the ignition of meteoric bodies is ascribed by the advocates of the volcanic theories to the friction with which they have to contend, on entering our atmosphere. There can be no doubt of the plausibility of this part of the reasoning; and the only difficulty is to find a starting place for them.

It is objected to the volcanic theory, that the velocity of meteors is too great to admit the belief that they are moved only by the force of gravitation in combination with their projectile force. A body falling from infinite space would, on reaching the earth, have acquired a velocity of no more than seven miles a second, whereas some meteors appear to move at least three times faster.

Another argument is sufficient of itself to refute the idea of the lunar origin of meteors. An explosion competent to project bodies as large as meteors often are, beyond the power of the moon's attraction, would be productive of a degree of reaction which would cause a sensible anomaly in the moon's motion. Some idea may be formed of the amount of this reactive force by reflecting that the number of meteoric masses which reach the earth would be only a small proportion of the whole number ejected from our nocturnal luminary. Now, as every cause producing the slightest irregularity in the moon's motions has been precisely computed, demonstrating that no other cause is in operation, I think we may fairly infer, on this ground, that the theory is untenable.

Professor Clapp, late president of Yale College, Con., has advanced a theory of meteors in which he considers them to be terrestrial comets, revolving round the earth, and parting with fragments of their substance as they pass the globe in the nearest point of their orbits. The argument deduced from the velocity of meteors, which I just now presented, also applies to this hypothesis. And like the volcanic theories, this requires a distinction between the falling stars, which occur in myriads, and the larger fire-balls, whose aspect is more formidable, and which we know to be composed, in some cases at least, of a solid substance.

I have stated that one theory ascribes meteors to the bursting of the supposed planet, of which the four asteroids are the principal fragments. The former existence of such a planet is at best fabulous, and is not among the articles of my belief. This doctrine, however, has been recently urged with no little ingenuity to explain the late phenomenon witnessed in the United States. I refer to an article published in the National Intelligencer about a month since, written by Benjamin Hallowell of Alexandria. The objections to considering all meteors as solid bodies apply with their full force to this theory. Were it true, every body would now have in his pocket a specimen of the stones which fell on that memorable occasion.

Another writer in a paper published in Uniontown, Pa., after giving a good description of the same phenomenon, proceeds to attribute it to electricity. He supposes a current of warm air rising from the earth in a whirlwind or "swirl," in the form of a funnel, and passing through a vent in an upper strata of air, to be afterwards distributed in all directions from this vent. The air is supposed to carry with it an excess of the electrical fluid which it parts with at the opening of the funnel, which thus becomes the meteoric pole. From this point the electrified current of air radiates the fluid in all directions, giving rise to the peculiar appearances in question. The best that can be said of this hypothesis is that it exhibits the exercise of a brilliant fancy and an ingenious turn of mind. But it is beyond the reach of facts, and it is too purely conjectural to be satisfactory.

I have already observed that electricity affords, in my opinion, the most rational solution of the most common meteoric phenomena—shooting stars, as they are called. Whether the same agent may with propriety be supposed to give rise to those having a solid substance, is a matter of doubt. For my own part, I confess myself dissatisfied with every theory now extant on this interesting subject. The properties of the electric fluid are so mysterious and so varied, and its true nature withal so little understood, that it probably presents to us as convenient a theory as we can find. True, it is not easy to account for the generation of stones in the atmosphere by these means. The electrical spark, however, when passed through certain gaseous combinations containing carbon, is capable of separating the carbon in a solid form. By the process of combustion, also, similar effects can be produced, showing with what facility a solid product may be formed from æriform materials. We may suppose, though it must be acknowledged the hypothesis is somewhat strained, that the primitive elements of meteoric stones exist in the elevated regions of the air, and that this mysterious fluid has the power of combining them so as to produce the end in ques The discoveries of galvanism have developed facts before as incredible this view now appears. Witness the decomposition of several bodies, the transmission of their elements through a metallic wire to the diff poles of the galvanic apparatus. Galvanic experiments and discove have almost revolutionized the science of chemistry, and they give us sonable cause to doubt whether those bodies which we are wont to re as simple and uncompounded are not in reality compound bodies; and ther all the immensely diversified objects of the universe, with all t varied and opposite qualities, will not be discovered ultimately to co of different combinations of a few, perhaps one or two, rudimental pri ples of nature, of which the electric fluid is simply a modification.

In conclusion, I would observe that if any of my readers are not satis with my views on the subject of meteors, they may consult their taste regard to the other theories, or even exercise their ingenuity in the in tion of new ones. The field is open for research, and there is ample r for the exertion of the imaginative faculty. Virtually, there are only theories of meteors now before the world. One of these is the ele theory. The other is the theory which regards meteors as solid bod circulating throughout space, and occasionally bending their course in direction of the earth, and spending themselves in an assault on our lunary star; having caught fire by friction as they pass through our at phere. From what source they spring is not very material—whether f the dire explosion to which the asteroids owe their existence—whe from the volcanic forges of our globe, or from the countless Ætnas of fire-fraught moon—or whether they are scraps of the universe which not worked up in the fabrication of the spheres. H. G

Wilmington, Del.

THE ADVOCATE OF SCIENCE.

Twelfth Month 19, 1833.

An apology is due for the exceeding late appearance of the present n ber of our paper. Its delay has been totally unavoidable on our part, as very few save our brother wights of the art, could appreciate the rea that might be assigned in justification of it, we beg our readers to excuse while we promise amendment in future.

We regret to say we are unable at present to comply with the wishe many of our new subscribers, by sending them the numbers from the c mencement of the work. We will endeavor to supply the deficiencies our present subscribers but we cannot furnish new ones with copies f the beginning. We purpose making some considerable alterations in form of the Advocate, at the conclusion of the present volume; the na of this alteration will be shortly made known.

We call the attention of our readers to the article of our correspon "Junius" published in the present number of our paper. The subject is on which we designed to make some remarks but this communication swers our purpose.

We insert a communication from Agricola. The subject of which speaks is one of greater importance to the agricultural interest than is erally imagined. It is certainly to be regretted that such a spirit of hosti against animals which are of unquestionable service to man, should maintained simply because their utility cannot be detected by persons willingly blind themselves to the revelations of nature. It is totally unj fiable, and cruel in the extreme.

> "The heart is hard in nature, and unfit
> For human fellowship, as being void
> Of sympathy, and therefore dead alike
> To love and friendship both, that is not pleas'd
> With sight of animals enjoying life,
> Nor feels their happiness augment his own."